

HALO-(AC)³ – 2022/04/04 – Polar5 research flight 10

Objectives:

Intensiv measurements

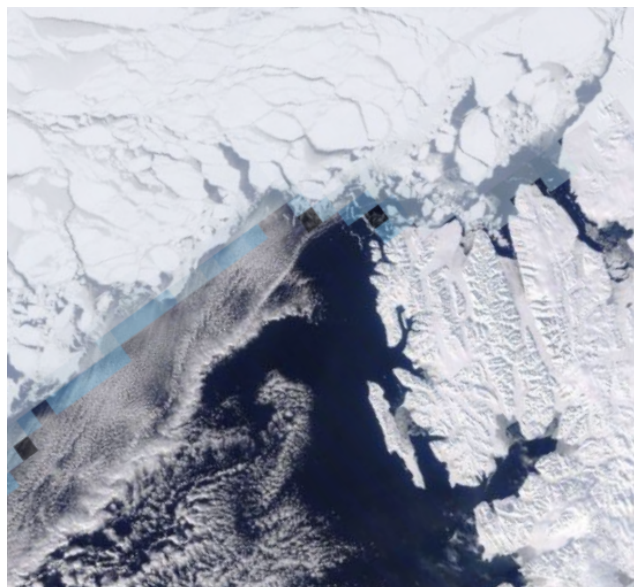
Meet with Polar 6 and HALO on the intensive measurement leg.

Polar 5 Crew	
Mission PI	Mario Mech/Sabrina Schnitt
Basis Data Acq.	Dennis Ludwig
SMART/ Eagle/Hawk	Evely Jäkel
MiRAC / AMALi	Imke Schirmacher
Dropsondes	Nina Maherndl
Pilot	James Steward
1st officer	Noah Hladiak

Mission PI P5:

Mario Mech mario.mech@uni-koeln.de

Polar 5	
Take off	10:06 UTC
Touch down	14:22 UTC
Flight time	04:16



MODIS RGB composite satellite image and sea ice fraction observed by the Advanced Microwave Scanning Radiometer (AMSR2) (screenshot from NASA worldview) for the measurements region on 4 April 2022.

Weather situation as observed during the flight (compare to forecast):

The weather situation above Svalbard featured weak flow conditions. The easterly flow in eastern Fram Strait and south of Svalbard and the northerly flow in western Fram Strait established a pronounced convergence line in the Greenland Sea that was orientated from north-east to south-west and was accompanied by precipitation.

Overview:

During this flight, collocation with P6 and HALO was planned while overflying a convergence line West of Svalbard and a weak CAO over the Fram Strait. Thereby, the Ps should have stayed on the same path throughout their legs back and forth.

The Eastern end of the leg has been marked with a convergence line that should convective clouds with a top of 1.5 km and precipitation underneath. Westward this convergence faded into cloud streets parallel to the convergence with decreasing cloud tops. Once reaching the ice edge, the clouds quickly disappeared.

Collocation with P6 and HALO work again quite well.

Instrument Status:

Polar 5	
Basis data acquisition	Green
Nose Boom	Yellow
MiRAC-A	Green
HATPRO	Green
AMALi	Green
SMART	Yellow
Eagle	Yellow
Hawk	Green
Dropsondes	14

Table S5.1: Instrument status as reported after the flight for all instruments on Polar 5.

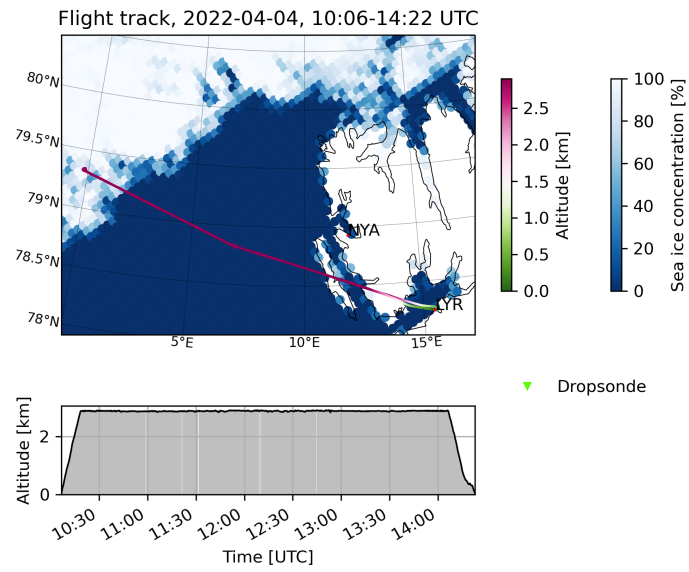
Comments: Noseboom was only partly working like the days before.

Detailed Flight Logs:

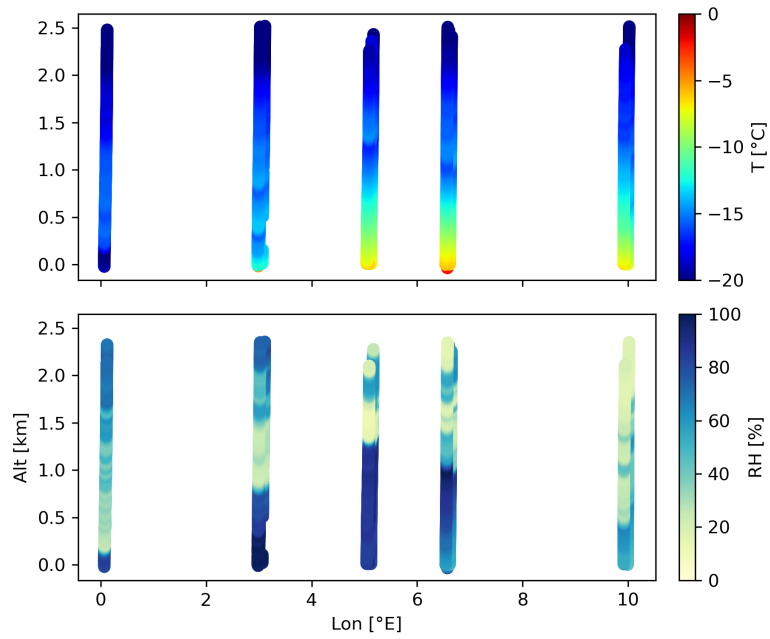
10:06 take off
10:10 roller doors
10:18 10000ft
10:19 AMALi on
10:32 DS1 over open ocean in clear sky
10:33 low level clouds ahead

10:34 no cirrus
10:36 reached first clouds
10:39 hazy to the West
10:46 DS2 just at the cloud edge
10:50 clouds in radar
10:51 precip in radar
10:55 cloud top at 4200ft at Eastern end
10:56 decreasing cloud top to 2700ft and constant
10:57 in front we see that the clouds are gone as soon as we are over ice
11:03 cloud top just decreased 1500ft and further to 1200ft
11:07 DS3 out
11:08 cloud streets to the South
11:09 see sea ice to the South and the quickly forming cloud streets
11:11 clouds from 900ft to ground
11:13 pane cake ice West of cloud edge
11:13 clouds stopped
11:14 no signal no more in lidar
11:15 no signal in radar
11:23 DS4 at Western most point
11:25 turn at WP2
11:36 clouds forming above the bigger leads
11:43 cloud streets to the North
11:48 DS5 at some location at DS3
11:55 get ready and connect old sonde from 2016. it has a battery of 9V compared to the new one from Aug. 2021 which average battery of 5.7V
12:00 cloud depth and ctp 3300 ft
12:02 DS6 (old one) launched
12:04 cloud top at about 4200ft
12:05 clouds are gone
12:16 DS7
12:25 DS8 (old one)
12:33 cloud streets in radar
12:34 weak turbulence due to stronger winds
12:35 DS9
12:37 clouds over sea ice
12:42 clouds gone in radar over sea ice
12:51 turn at WP2
12:55 DS10
13:06 clouds start in radar
13:06 weak turbulence again
13:14 DS11
13:28 DS12
13:38 DS13
13:40 at WP1 speed up to cruise speed
13:54 DS14 in clear sky
13:57 AMALi off
14:23 touch down

Quicklooks:

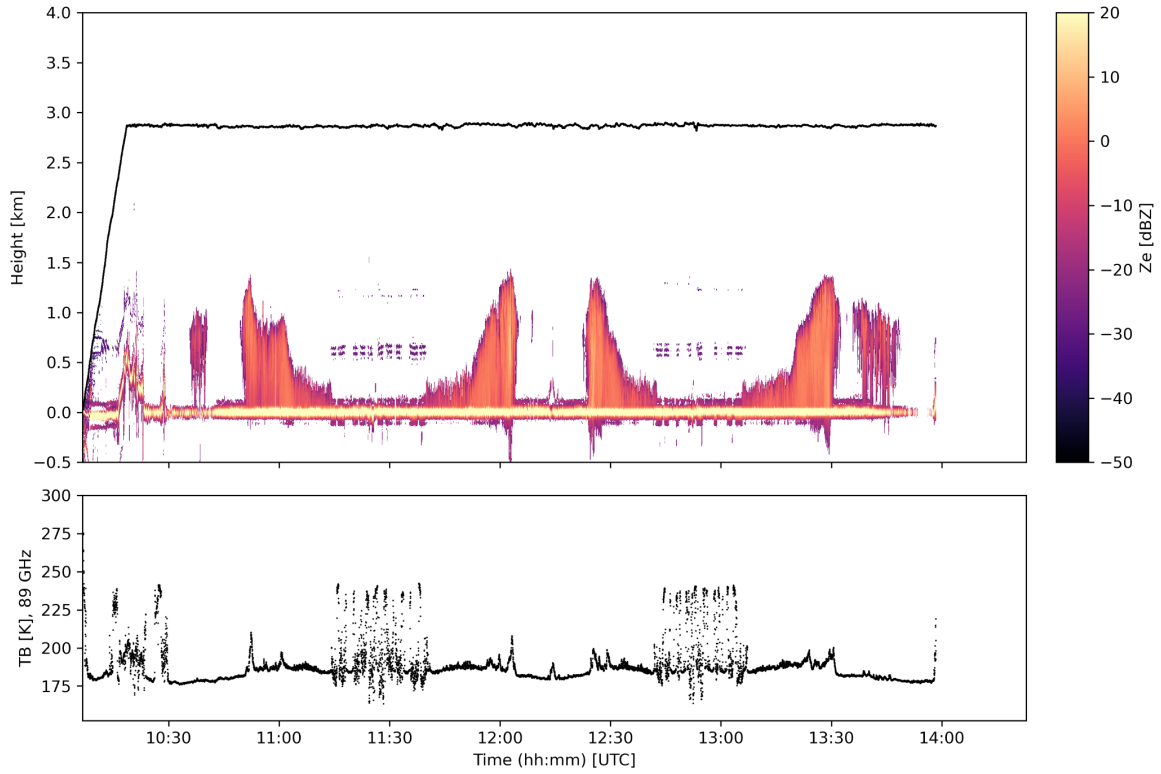


Flight track including sea ice coverage, dropsonde location and flight altitude.



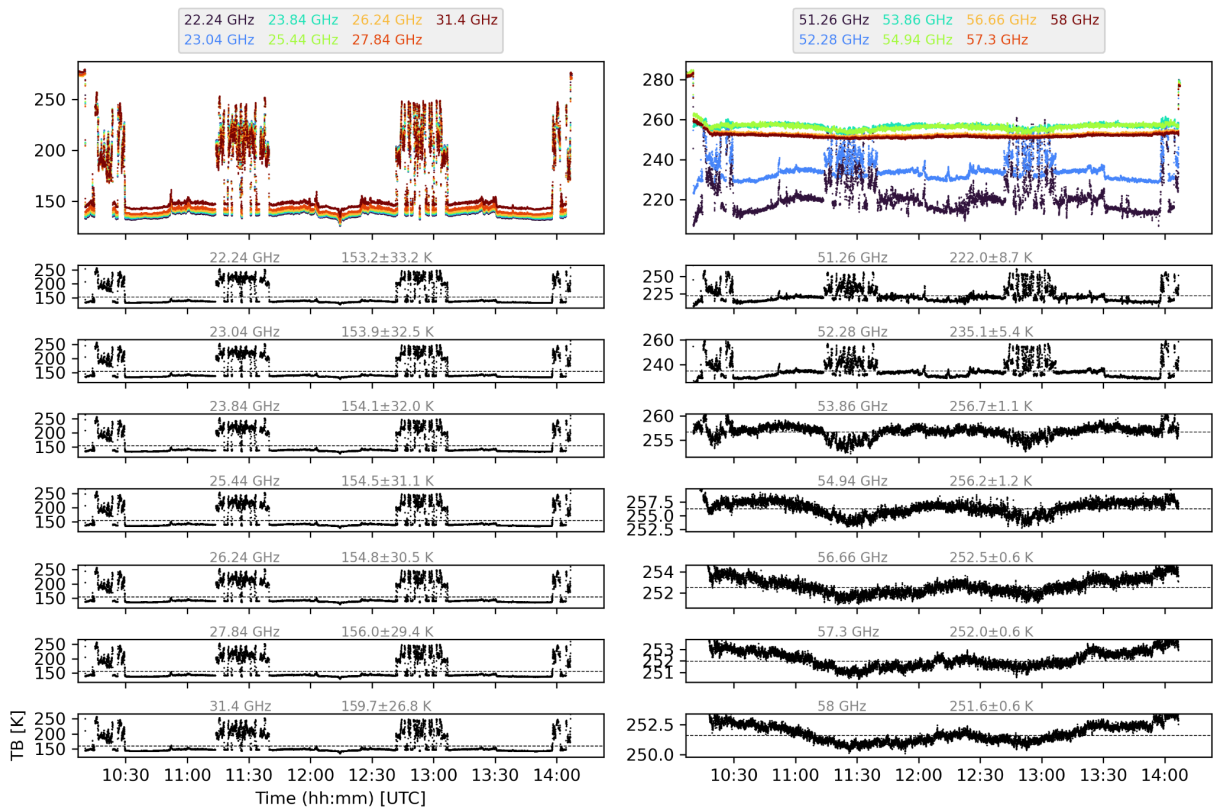
Dropsondes on all legs along longitude.

MiRAC-A, 2022-04-04, 10:06-14:22 UTC

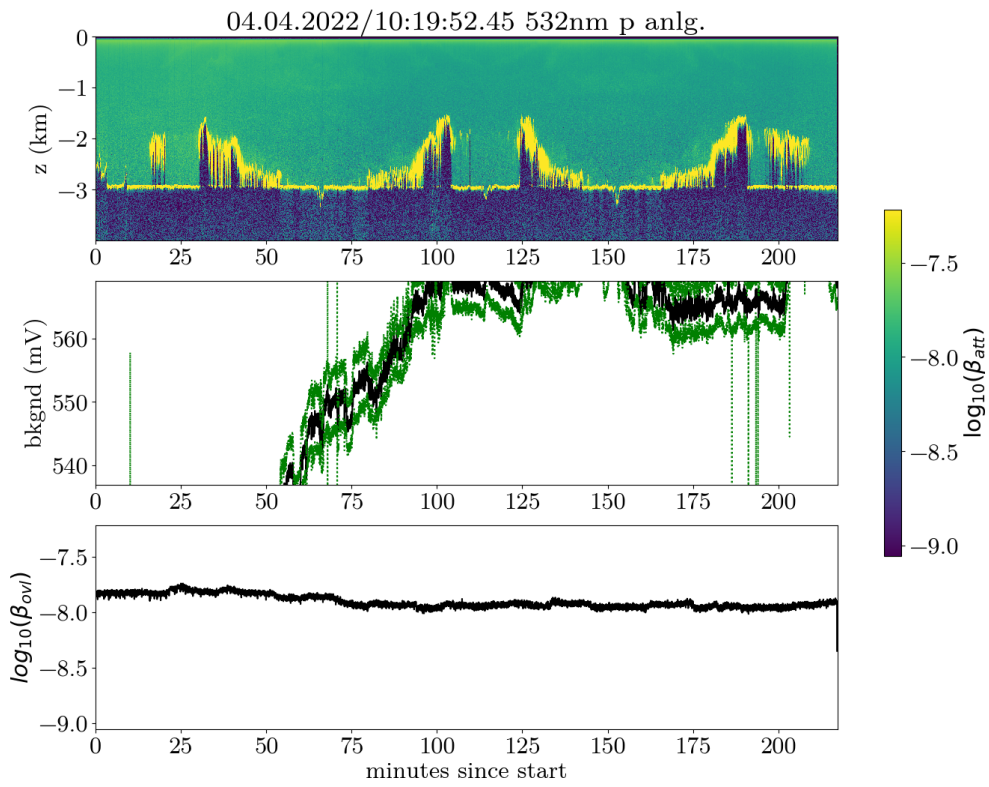


MiRAC radar reflectivity and 89 GHz brightness temperatures.

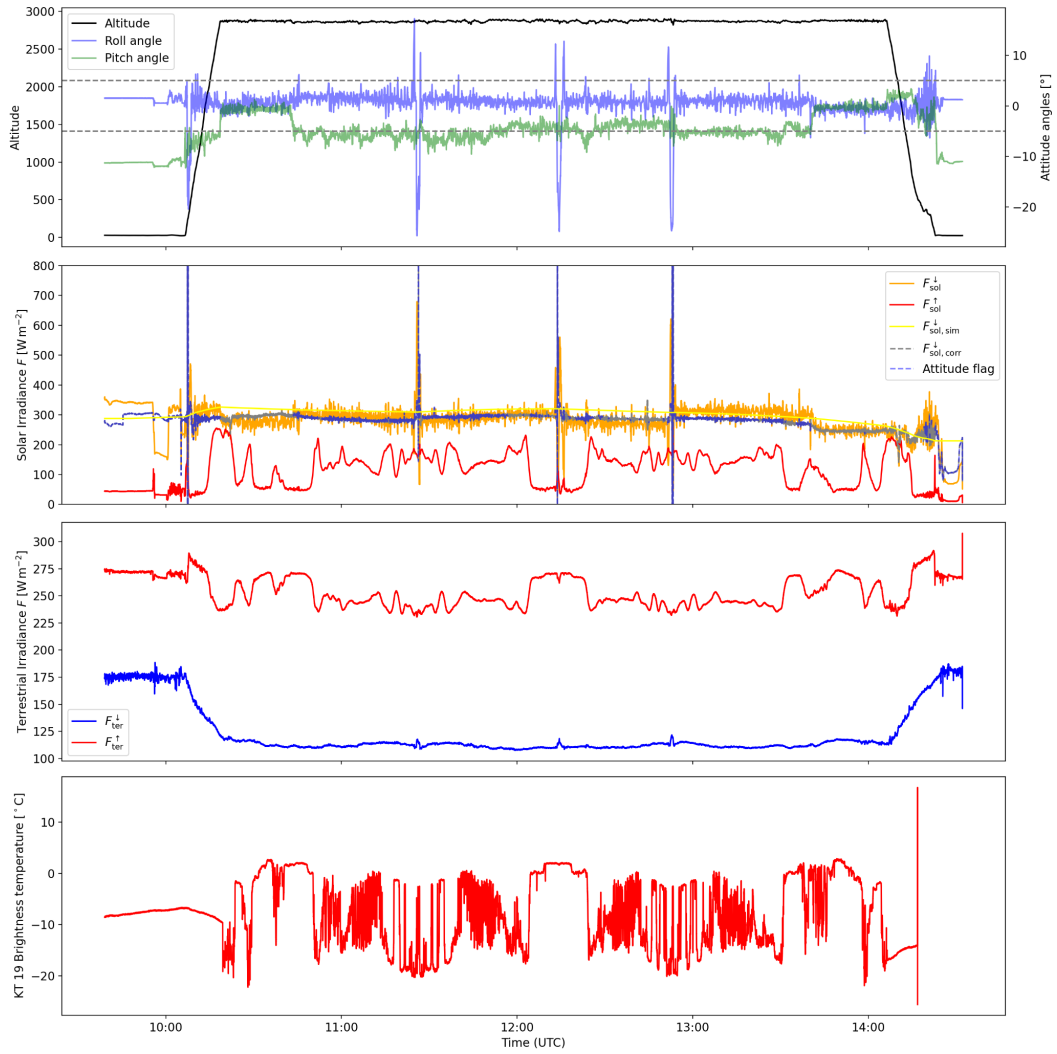
HATPRO, 2022-04-04, 10:06-14:22 UTC



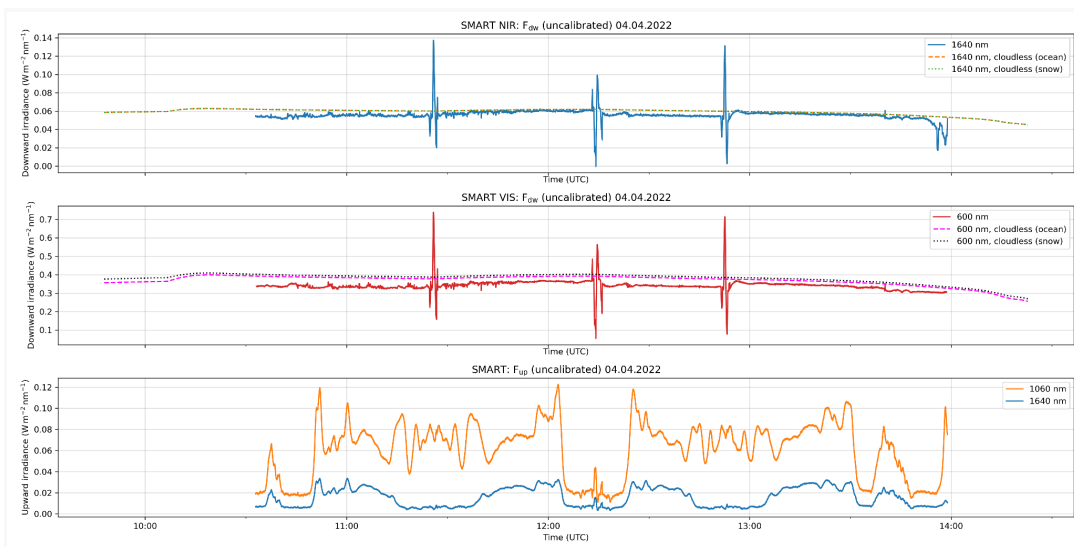
HATPRO brightness temperature observations at 22GHz water vapor channels (left) and oxygen band at 58 GHz (right).



AMALi backscattering at 532 nm



Broadband radiation measurements and KT19.



SMART spectral radiances.

Nikon camera can be found on the [wiki](#).